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Assembly of block copolymer films between chemically patterned and chemically homogeneous surface JEONG IN LEE, HUIMAN KANG, HYO SEON SUH, CHRISTOPHER THODE, University of Wisconsin, LEI WAN , HGST, ABELRADO HERNANDEZ , University of Wisconsin, YASUHIKO TADA, HIROSHI YOSHIDA , Hitachi Ltd., JUAN DE PABLO, PAUL NEALEY, University of Wisconsin — Many technologically useful block copolymer systems other that poly(styrene-block-methylmethacrylate) are currently not amenable for directed assembly because one of the blocks has a lower surface energy, segregates to the free surface of the film, and disrupts directed assembly of the film (at least with respect to realizing perpendicularly oriented through-film domains) on the underlying chemical pattern. Cross-linkable random copolymer mats were developed as well as methods to deposit them on the surfaces of block copolymer films. The chemistry of these "top coats" can be tuned to impart preferential and non-preferential wetting properties towards the blocks of the block copolymer films. The three-dimensional morphology of block copolymers assembled between lithographically-defined chemically patterned surfaces and top coats of varying wetting properties were characterized using specialized sample preparation techniques and cross-sectional scanning electron microscopy. The resulting structures compare favorably with molecular simulations. A primary technological objective of the top coat strategy is to direct the assembly of block copolymer systems that allow for sub-10 nm patterning and perpendicularly oriented domains.

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